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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/524,525 | 08/18/2005 | Martin Hausner | BEET-09 | 1134 |
| 26875 7590 09/26/2007 WOOD, HERRON & EVANS, LLP 2700 CAREW TOWER 441 VINE STREET CINCINNATI, OH 45202 | | | EXAMINER AHMED, SHAMIM | |
| | | | ART UNIT 1765 | PAPER NUMBER |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|--|--|
| Office Action Summary | Application No. 10/524,525 | Applicant(s) HAUSNER, MARTIN | |
| | Examiner Shamim Ahmed | Art Unit 1765 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 July 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 24-45 and 47-50 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 24-45 and 47-50 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 7/13/07 have been fully considered but they are not persuasive. As to claims 47-48, applicants argue that Nakagawa et al fail to teach the aluminum layer is used as masking layer during the etching of an underlying layer. In response to the argument, examiner states that the argument is not commensurate with the claim because the claim is limited to a product claim not a process claim and further more the aluminum layer is capable of working as a mask layer while the under layer to be etched.

As to Perry et al, applicants argue that the distance of 10 cm is the widthwise dimension of a uniformity region not the distance between the substrate and the plasma source.

In response to the argument, examiner states that the argument is not persuasive because the distance of the 10 cm is the distance between the plasma source and the substrate as the uniform plasma is formed 10 cm above the substrate holder as taught by Perry et al.

Applicant also argue that Perry et al teach that the etch rate is 07 to 03 $\mu\text{m}/\text{min}$ not 2 $\mu\text{m}/\text{min}$.

In response, examiner states that the etch rate can be optimized by one ordinary skilled in the art as the etch rate depends on various factors such s concentration of the etch chemistry, temperature etc.

Therefore, the previous office action is repeated herein as follows:

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 47-48 are rejected under 35 U.S.C. 102(b) as being anticipated by Nakagawa et al (5,599,743).

Nakagawa et.al teach a semiconductor wafer (1) and a masking layer (4) of aluminum alloy film (col.1, lines 19-27 and figure 1), in which the aluminum ally comprises 0.5 to 1 weight percent of silicon or the alloy could comprises copper in the range of 0.1-4 wt. Percent (col.3, lines 49-59).

It is noted that titanium content is optional in the aluminum alloy.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 24-45, and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Song et al (6,821,901) in view of Perry et al (XP 000046563).

Song et al disclose a silicon etching process utilizing an inductively coupled plasma etching through a masking layer of aluminum, wherein the etching is dry etching

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and the etching is performed in Bosch process such as etching and passivation steps are carried out alternatively (col.5, lines 50-col.6, line 7).

Song et al teach the etching create an etched cavity of about 250 μm deep (col.6, lines 7-9).

Song et al differs from the instant invention in that the substrate is kept at a distance of at least twice the mean free path length of the plasma atoms or at least 8 cm from the inductive coupling.

Perry et al disclose (page 148, left-hand column, lines 24-25 and 47) the inductively coupled plasma etching of a silicon substrate with aluminum as a mask, characterized in that the substrate is kept at a distance of at least 10 cm from the inductive coupling.

Perry et al disclose in particular that introducing the substrate into a diffusion zone rather than into the plasma source itself can produce more homogeneous plasma.

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of claimed invention to employ Perry et al's teaching into Song et al's process for producing homogeneous plasma as taught by Perry et al.

As to claims 26,28, Perry et al discloses that the pressure during etching is 0.5 mTorr (claim 26), the mask has a thickness of below 0.6 μm 0.42 μm (claim 28).

As to claim 27, depositing the material all the way across to the other side of the substrate is merely one of several obvious possibilities from which a person skilled in the art would select according to the circumstances as illustrates in Song et al

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As to claim 30, Song et al teach that aluminum is vapor deposited by generally known method such as PVD (col.5, lines 19-21).

As to claims 49- 50, it would have been obvious to optimize the etched depth, which is dependent on the type of device to be formed.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Becker et al (6,531,031 B1) disclose a **plasma processing system wherein the substrate and/or the ICP coil are arranged so as to provide maximum distance between the substrate and the ICP coil perpendicularly to the coil plane the distance could be 10-30 cm (col.5, lines 60-col.6, lines 1-9)**

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shamim Ahmed whose telephone number is (571) 272-1457. The examiner can normally be reached on M-Thu (7:00-5:30) Every Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G. Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Shamim Ahmed
Primary Examiner
Art Unit 1765

SA
September 22, 2007